PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Glasses for the Manufacture of Superfine Fibres

We, ACTIEN-GESELLSCHAFT DER GERRESHEIMER GLASHÜTTENWERKE VORM. FERD. HEYE, a German Company, of Düsseldorf-Gerresheim, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Mineral fibres of great or infinite length with a diameter of more than 5 μ, can be manufactured according to the known Owens blowing process by allowing the blowing jet to act at high velocity on the streams of molten mass coming from the nozzles of the container for the molten material in the direction of their flow, and drawing the streams to a smaller diameter. On the other hand very fine fibres, namely with a diameter of less than 5 μ, have been produced according to the known mineral wool blowing process (slag wool, rock wool). This cannot be achieved by the action of drawing alone. Rather it is necessary when blowing for there to be a tearing and dividing up of the streams of material. The resulting fine fibres are short and have an appearance similar to wadding. One difficulty, however, is that the product contains a large proportion of coarse drops, which may reach up to 50% by weight.

By improving the blowing technique of this process attempts have been made to improve the quality of these fine mineral wools and particularly to reduce the proportion of coarse drops without, however, any satisfactory result having been achieved.

It has now been found that it is possible to produce a very fine fibre with a diameter below 5 μ by the known blowing or centrifugal process of disintegrating the stream of molten material and to avoid the occurrence of coarse drops, by using, for the manufacture of these fibres, glasses of silica binary or ternary systems which contain practically no alumina, e.g. glasses of the following systems:

$CaO—SiO_2$

$BaO—SiO_2$

$CaO—MgO—SiO_2$

$CaO—FeO—SiO_2$

$CaO—ZnO—SiO_2$

The melts of such systems are very similar to salt melts. Their principal characteristic is high surface tension in conjunction with very low viscosity which is maintained almost directly until devitrification, when it then increases rapidly. Owing to these properties, the melt, on being blown is first reduced to a multiplicity of very small drops (like mercury) which are then drawn out into very fine fibres. The drops still contained in the wool are so small that they can scarcely be perceived with the naked eye. The melts of the binary and ternary systems also have the advantage in the blowing process that they lead to higher capacity because, in consequence of its lower viscosity, the melt flows out more easily and rapidly through the nozzles of the container for the molten material.

Mineral fibres known up to now all contain considerable quantities of alumina, or they contain in addition to the usual constituents other common additions which cause the viscosity to rise steadily over a fairly long range, for example a range of 500°, up to the setting point. The generally lower surface tension of these melts cannot remain effective sufficiently long, owing to the more rapid rise in the viscosity, so that only a coarse disintegration of the melt is achieved.

Previously it has not been thought possible to dispense with the use of alumina in the manufacture of mineral fibres in order to obtain strong, i.e. weather-resistant, fibres. It has now been shown, however, that at least equal, if not better, chemical and physical properties of the end product can be achieved if the composition of the melt is so selected as to obtain a congruent melting chemical compound which at the same time does not suffer from any chemical change, for example:

$CaO—MgO—2\ SiO_2$;

[Price 3s. 6d.]

$2\ CaO—MgO—2\ SiO_2$;
$2\ BaO—3\ SiO_2$;
$CaO—FeO—SiO_2$.

(Melting is "congruent" when the chemical composition of the solid phase is identical with the composition of the liquid phase throughout melting.)

Mineral wools of such chemical compounds show, in consequence of their stronger molecular bond, a considerably better chemical resistance than wools of simple silicate mixtures so that one can omit the usual addition of alumina.

Polymorphous compounds should be avoided because when higher temperatures act on the mineral wools disintegration may occur by crystal conversion, a process which has frequently been observed in mineral wools known up to now.

What we claim is:—

1. Glasses, for the manufacture of very fine mineral fibres by disintegration of the melt in blowing or centrifugal processes, consisting of chemical compounds of silica binary or silica ternary systems, substantially free from alumina, which melt congruently and are unchanged in conversion from the solid to the liquid phase.

2. Glasses according to claim 1 wherein the system is $CaO—SiO_2$.

3. Glasses according to claim 1 wherein the system is $BaO—SiO_2$.

4. Glasses according to claim 1 wherein the system is $CaO—MgO—SiO_2$.

5. Glasses according to claim 1 wherein the system is $CaO—FeO—SiO_2$.

6. Glasses according to claim 1 wherein the system is $CaO—ZnO—SiO_2$.

7. A process for the manufacture of very fine mineral fibres, wherein a melt of a glass according to any one of the preceding claims is blown and first reduced to very small drops which are then drawn out to form the very fine fibres.

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